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Indian Standard
DIMENSIONS FOR CERAMIC BUSHINGS FOR TERMINALS

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Indian Standard

DIMENSIONS FOR CERAMIC BUSHINGS FOR TERMINALS

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2

Indian Standard
DIMENSIONS FOR CERAMIC BUSHINGS FOR TERMINALS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 22 September 1982, after the draft finalized by the Electrical Insulators and Accessories Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard covers the dimensions for ceramic bushings for terminals for power capacitors and other electrical equipment.

0.3 It has not been found possible to cover the requirements and methods of tests for ceramic bushings in this standard. However it is intended, to cover these requirements in a separate Indian Standard, or if necessary to modify the present standard, at a later stage. The properties of ceramic material to be used in the manufacture of bushings are covered in IS : 8765-1978*.

0.4 In preparing this standard, assistance has been derived from DIN 41108-1971 'Ceramic terminal tubes', issued by the Deutscher Normenausschuss.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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1. SCOPE

1.1 This standard covers the dimensions for ceramic bushings required for insulating the terminals of electrical equipment, such as rotating machines and power capacitors.

---

*Specification for ceramic insulating materials for electrical purposes.
†Rules for rounding off numerical values (*revised*).

1.2 This standard covers the ceramic bushings for flameproof enclosures also.

1.3 Ceramic bushings covered in that standard are only the insulating inserts. Metallic terminal studs and fastners shall be selected according to the requirements of the rotating machines and power capacitors.

2. TERMINOLOGY

2.0 For the purpose of this standard the following definitions shall apply.

2.1 Ceramic Terminal Tube — A cylindrical tube of ceramic material with metalic coating at both ends on outer periphery and used as insert between terminal and base plate.

2.2 Flameproof Ceramic Terminal Bush — A ceramic bush with metallic housing for fixing to base plate and satisfy the conditions of flameproofness specified in IS : 2148-1981*.

3. MATERIAL

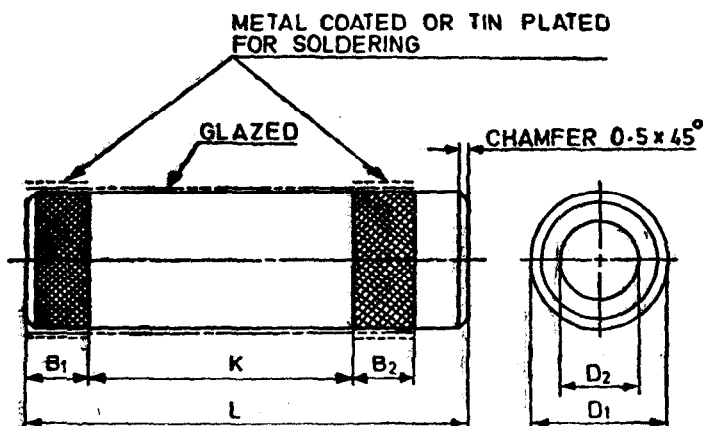**3.1** The material for ceramic bushings shall conform to IS : 8765-1978†.

4. DIMENSIONS

4.1 The dimensions of ceramic terminal tubes shall conform to Fig. 1.

4.2 The dimensions of flameproof ceramic terminal bushings shall conform to Fig. 2.

METAL COATED OR TIN PLATED
FOR SOLDERING

GLAZED

CHAMFER 0·5 x 45°

B₁ K B₂

L

D₂

D₁

OUTSIDE DIAMETER D_1	INSIDE DIAMETER D_2	LENGTH L	CREEPAGE DISTANCE K	LENGTH OF METAL COATING	
				B_1	B_2
(1)	(2)	(3)	(4)	(5)	(6)
10	$3·5\ ^{+\ 1}_{-\ 0}$	38	16	6	8
12	$3·5\ ^{+\ 1}_{-\ 0}$	38	16	6	8
16	$5\ ^{+\ 1}_{-\ 0}$	30	12	6	6
20	$8\ ^{+\ 1}_{-\ 0}$	52	21·5	10·5	8
24	$11\ ^{+\ 1·5}_{-\ 0}$	50	24	8	9
24	$11\ ^{+\ 1·5}_{-\ 0}$	86·5	38·5	10	9

NOTE 1 — The allowable tolerances on lengths shall be ± 1 mm and on diameter D_1 shall be ± (0·03 d + 0·3) mm, where d is the diameter.

NOTE 2 — The ceramic terminal tubes may be fixed to the base plate wherever required, by means of permanent cement or soldering the metal coating.

All dimensions in millimetres.

FIG. 1   DIMENSIONS OF CERAMIC TERMINAL TUBE

FLAME PROOF JOINTS FILLED WITH PERMANENT CEMENT

GLAZED PORTION

CERAMIC BUSHING

F·F

METALLIC HOUSING

SOLDERED TO LOCK RING AND HOUSING
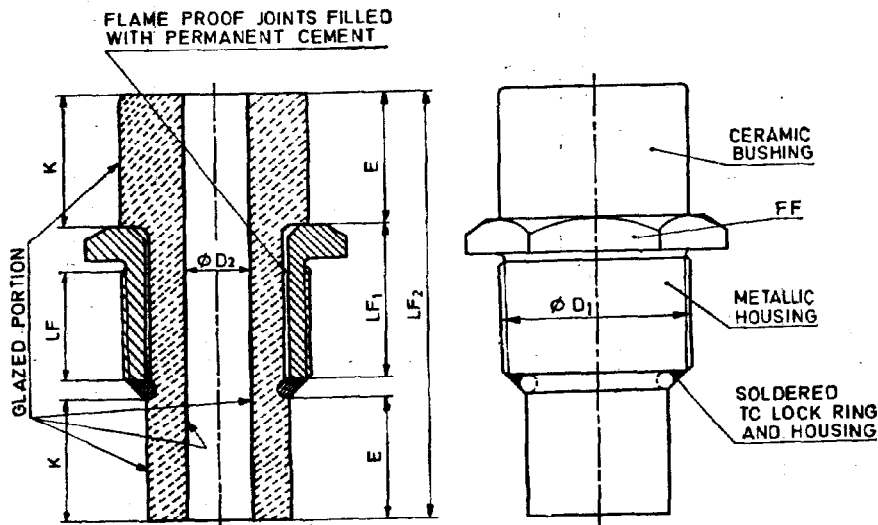
SIZE	METALLIC HOUSING DIAMETER (D_1) × PITCH	INSIDE DIAMETER		AXIAL LENGTH OF THREAD-ING ON HOUSING (Min) LF	LENGTH OF FLAME PATHS (Min)		FACE TO FACE DIMEN-SIONS OF HEXA-GONAL HEAD (Min) FF	CREEPAGE DIST-ANCE (Min) K			CLEARANCE BETWEEN PHASE TO EARTH (Min), E		
		D_2	Toler-ance		LF_1	LF_2		Up to and Includ-ing 250 V	Above 250 V Up to and Includ-ing 650 V	Above 650 V Up to and Includ-ing 1 100 V	Up to and Includ-ing 250 V	Above 250 V Up to and Includ-ing 650 V	Above 650 V Up to and Includ-ing 1 100 V
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
01	M16×1·5	4	+ 0·8 + 0·4	13	25	25	19	16	25	32	13	19	25

02	M16×1·5	3	+ 0·8 + 0·4	13	25	25	19	16	25	32	13	19	25
03	M20×1·5	6	+ 0·8 + 0·4	13	25	25	24	16	25	32	13	19	25
04	M24×1·5	8	+ 1·0 + 0·4	13	25	25	30	16	25	32	13	19	25
05	M30×1·5	10	+ 1·0 + 0·4	13	25	25	36	16	25	32	13	19	25
06	M30×1·5	12	+ 1·1 + 0·4	13	25	25	36	16	25	32	13	19	25
07	M36×1·5	16	+ 1·1 + 0·4	13	25	25	46	16	25	32	13	19	25
08	M42×1·5	20	+ 1·2 + 0·4	13	25	25	55	16	25	32	13	19	25

NOTE 1 — The creepage distance 'K' may be increased irrespective of dimension 'E' by providing suitable contours on the bushing.

NOTE 2 — The clearances along the lengths of flamepaths of metal to ceramic joints shall be filled with permanent cement as given in Appendix A of IS : 2148-1981*.

NOTE 3 — The threaded length 'LF' of the flameproof ceramic terminal length shall have minimum engagement of 8 mm when measured axially and tortuous length over the engaged threads shall be at least 1·5 times the axial length. At least five full threads shall be engaged when it is fixed in position. The clearance (gap) along the threaded tortuous length shall conform to IS : 2148-1981*.

NOTE 4 — The inner and outer surfaces (except surface covered by metallic housing) of the bushing shall be glazed and the ends shall be unglazed.

*Specification for flameproof enclosures of electrical apparatus (*second revision*).

All dimensions in millimetres.

FIG. 2   DIMENSIONS OF FLAMEPROOF TERMINAL BUSHING

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Definition
Force	newton	N	$N = 1 \text{ kg.m/s}^2$
Energy	joule	J	$1 \text{ J} = 1 \text{ N.m}$
Power	watt	W	$1 \text{ W} = 1 \text{ J/s}$
Flux	weber	Wb	$1 \text{ Wb} = 1 \text{ V.s}$
Flux density	tesla	T	$1 \text{ T} = 1 \text{ Wb/m}^2$
Frequency	hertz	Hz	$1 \text{ Hz} = 1 \text{ c/s } (\text{s}^{-1})$
Electric conductance	siemens	S	$1 \text{ S} = 1 \text{ A/V}$
Electromotive force	volt	V	$1 \text{ V} = 1 \text{ W/A}$
Pressure, stress	pascal	Pa	$1 \text{ Pa} = 1 \text{ N/m}^2$